Abstracts

A Monolithic AlGaAs/InGaAs Upconverter IC for K-Band Wireless Networks

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This paper concerns with the design consideration, fabrication process, and performance of a CPW heterojunction FET (HJFET) upconverter MMIC for K-band wireless system applications. To realize a mixer featuring a simple structure with inherently isolated ports, and yet permitting independent port matching and low LO power operation, a "source injection" concept is introduced by treating the FET as a three-port device in which the IF and LO signals are, respectively, applied to the gate and source terminals, and RF signal is extracted from the drain terminal. The upconverter chip incorporates an HJFET as a mixing element, an IF matching network, an LO matching network, an RF matching network, and an output filter. The upconverter can operate with an LO power level as low as -16 dBm for IF signals in 1.5-2.5 GHz band, and LO signals in 20-23 GHz band. Including a 3 dB pass-band insertion loss of the filter, the upconverter exhibits a maximum conversion gain of -6 dB for an IF power of -5 dBm at 1.9 GHz, and an LO power of 10 dBm at 21.5 GHz. LO suppression at IF and RF ports, respectively, is better than 22 dB and 20 dB, and IF suppression at RF port is better than 35 dB.

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